United States Department of the Interior

U. S. GEOLOGICAL SURVEY
WESTERN FISHERIES RESEARCH CENTER
COLUMBIA RIVER RESEARCH LABORATORY
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A. Title: Application for a Permit for Scientific Purposes Under the Endangered Species Act of 1973: Assessment of current use and productivity of fish in the lower White Salmon River prior to the removal of Condit Dam.

B. Species: Middle Columbia River ESU steelhead (*Oncorhynchus mykiss*), Lower Columbia River ESU Chinook salmon (*O. tshawytscha*), Lower Columbia River ESU coho salmon (*O. kisutch*), and Columbia River ESU chum salmon (*O. keta*) from the White Salmon River, WA.

C. Date of Permit Application: November 18, 2005

D. Applicant Identity:

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E. Information on Personnel, Cooperators, and Sponsors.

Lead Agency: U. S. Geological Survey
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Scientists: Dr. Patrick J. Connolly, Principal Investigator, Research Fish Biologist
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Disposition of Mortalities:

Incidental fish mortalities (not to exceed 5%) will be put on ice and delivered to the U.S. Fish and Wildlife Service's Lower Columbia River Fish Health Center, which will provide a thorough disease profile as part of the U. S. Fish and Wildlife Service's National Wild Fish Health Survey (see contact information in Section E). These data will provide an important baseline on the health of existing fish populations in the selected sites.

A non-lethal tissue sample will be taken from a sub-sample of salmonids handled for future genetic analysis.

F. Project Description, Purpose, and Significance:

The completion of Condit Dam in 1913 blocked anadromous fish runs at river mile 3.2 of the White Salmon River. Because of a lack of recent sampling efforts, it is not known how much natural production occurs currently, or to what extent juvenile fish use the lotic portion of White Salmon River below Condit Dam. Condit Dam has been scheduled for removal in 2008 by PacifiCorp, the owner and operator. Without collection of natural production, juvenile growth, and genetic information of fish species within the White Salmon River, it is impossible to predict or track the positive and negative effects that dam removal will have on current production of important fish species such as Chinook, coho, steelhead, Pacific lamprey, bull trout, and sea-run cutthroat trout. It has largely been assumed, and predicted by modeling efforts, that reconnecting the upper White Salmon River to the Columbia River will result in increased natural production of several of these species. While this may be a reasonable assumption, a large question remains as to what natural stocks are most likely to succeed by natural recolonization and what stocks are available to incorporate into hatchery-based reintroduction. Before hatchery reintroductions are considered, managers will need to know what species and stocks are present in order to recognize needs and opportunities for developing hatchery stocks from current naturally produced fish in the White Salmon system.

This project responds directly to a recommendation for research from the U.S. Fish and Wildlife Service's Spring Creek National Fish Hatchery (NFH). Spring Creek NFH would benefit from information collected on current naturally produced fish in the White Salmon River. Spring Creek NFH, located 1 mile from the confluence of the White Salmon and Columbia rivers, has raised a stock of Chinook salmon native to the White Salmon River for over 100 years. From 1901 and until 1964, nearly uninterrupted collection of adult tule fall Chinook salmon occurred from the lower White Salmon River for spawning at Spring Creek NFH. The stock collected from White Salmon River has developed over many generations and is identified by the Columbia Basin Fish and Wildlife Authority and regional fishery biologists for reintroduction into the White Salmon River after Condit Dam removal. To take advantage of any remnant population of tule fall Chinook salmon that might exist in the White Salmon River, information is needed on juvenile production, on genetic relatedness to the hatchery population, and on general life history traits before a reintroduction effort is undertaken. We plan to take advantage of the unique opportunity that exists to link the efforts proposed in the White Salmon with ongoing efforts already funded in the Elwha River. Two Elwha dams,

which are similar in size to Condit Dam, are slated for removal in 2007-2008. The USGS Principal Investigator, Pat Connolly, is serving as a Principal Investigator for studies of these dam removals in the Elwha. To adequately compare and contrast fish response to dam removal in these two systems, a concerted effort must be expended to characterize fish use before the dams are removed. As being implemented in the Elwha system, a systematic sampling approach will be implemented. At least two habitat types will be differentiated for sampling, pools and non-pools. Stream margins will serve as index areas to document juvenile fish use and species diversity.

The objectives of the work are: 1) Determine the fish assemblage and fish use in the lower White Salmon River, 2) Assess growth and survival of juvenile salmonids as one index of productivity, 3) Contribute to complimentary efforts by the U.S. Fish and Wildlife Service to characterize life history, genetics, and fish health of Chinook stocks that currently use the lower White Salmon River, and 4) Coordinate sampling plans and compare results with ongoing efforts associated with the dam removal projects in the Elwha River system (Olympic Peninsula, WA) in order to maximize learning about fish response to dam removal efforts.

To accomplish the objectives above it will be necessary to handle the listed species that inhabit the lotic portion of White Salmon River below Condit Dam (approximately 1 km upstream of the confluence with the Columbia River). Because we are proposing to collect information on naturally produced salmonids there is no alternative to handling the listed species. Efforts will be taken to avoid all adult salmonids and to minimize any mortalities that may occur during juvenile fish collection and handling. Snorkeling, an alternative method that does not require fish handling, will be evaluated as a method during the pilot study. Weekly snorkeling in spring 2005 was attempted in the lower White Salmon to enumerate juvenile salmonids. This method was found to be ineffective due to poor visibility (Rod Engle, USFWS personal communication). We plan to include snorkeling as a supplemental method, but do not expect this alternative method to be effective. Also, passively viewing fish can not replace electrofishing and trapping methods for collecting genetic, growth, disease, and life history information.

G. **Project Methodology:**

This project is funded to begin fish sampling in March 2006 and end fish sampling in October 2007. The study area will extend from approximately river mile 1.0 of the White Salmon River to the base of Condit Dam at river mile 3.2. Limited information exists on White Salmon River fish stocks below Condit Dam, but local fisheries biologists believe coho salmon, tule fall Chinook salmon, upriver bright fall Chinook salmon, chum salmon, spring Chinook salmon, pink salmon and sea-run cutthroat may be present, with the latter four species mentioned expected to be infrequent or sporadic in number.

Juvenile fish will be sampled by backpack electrofishing, rotary screw trapping, and minnow trapping in the lotic portion of the lower White Salmon River (~ 1 mile upstream of the confluence with the Columbia River up to Condit Dam). All captured fish will be anesthetized

with 50 mg/L tricaine methanesulfonate (MS-222), measured for length, weighed, and examined for external diseases. A number of target species will be fin clipped to collect tissue for genetic analysis. These tissue samples will be labeled and stored in 95% ethanol. The MS-222 will be administered by diluting a stock solution of 100 g/L of MS-222 into a bucket containing river water and then placing fish into the bucket. Because the effectiveness of MS-222 as an anesthesia varies with factors such as temperature and fish density the concentration of anesthetic may need to be adjusted. Adjustment of the anesthesia concentration will be based on the amount of time it takes for a group of fish to lose equilibrium. Induction time will not be less than 1 min. nor exceed 5 min. If it is determined that the induction time at our standard concentration is less than 1 min or greater than 5 min, the concentration of the anesthetic will be adjusted. Under no circumstances will the MS-222 concentration exceed 70 mg/L. After handling the fish will be placed in a 5 gallon bucket or cooler (depending on the number of fish) and held until they fully regain equilibrium before returning them to the river. Screw trapping and electrofishing will be our primary methods for fish collection. Minnow trapping and angling may be conduced if electrofishing and screw trapping are not collecting a sufficient sample for analysis.

Backpack electrofishing will be attempted in the White Salmon River at the few accessible and wadeable locations between river mile 1 and Condit Dam. The electrofishing will be done during the low flow period from June through October. We will electrofish a 4.5 meter swath of the wadeable-margin areas of three mainstem pools and three non-pools. We will take care to avoid adult salmon and steelhead when electrofishing. Because we will be sampling the shallow margin areas we do not expect to encounter adult salmonids, since adult fish that may be holding in these areas should leave when they are alerted to our presence. If adult fish are encountered we will stop electrofishing in that area. All juvenile fish seen will be collected, treated as detailed above, and returned to the habitat unit from which they were collected.

A rotary screw trap will be installed above the most downstream riffle to aid in estimating natural production and gaining life history information of salmonids below the dam. In the first year the trap will run four days per week for two months (because of funding limitations), to help determine logistics and optimal trap location. In the second year, the trap will run seven days per week for a four-month period. In this second year, we will transport and release multiple subsamples of marked fish about 0.5 miles upstream of the trap to estimate efficiency (Thedinga et al. 1994). Fish will be marked with dye in the fins using a Panjet inoculator (Thedinga and Johnson 1995). The marks will change with different marked fin combinations to distinguish among release dates. Trap efficiency will be estimated using a modification of the Petersen estimate (Chapman 1951). With a trap efficiency estimate, we will be able to extrapolate values for deriving an estimate of the total number of outmigrants passing the trap.

To enumerate fish by species and size class, snorkeling will be attempted at various times during the spring and summer. However, we do not expect this to be a useful method due to the reasons detailed above (see Section F).

During electrofishing and screw trapping, there is a potential to injure or kill fish that are encountered. We will use the minimum volts necessary to stun fish when electrofishing and minimize the handling stress wherever possible. The screw trap will be checked daily when fishing and the cone will be raised when not in use. We will remove the screw trap after the sampling period described above. The trap will not be operated when adult fall Chinook and coho are present so we do not anticipate encountering them. The trap will be operated when adult spring Chinook and steelhead may be present, and it will be operated through the steelhead spawning period. While it is possible that adult salmon and steelhead can be caught in the screw trap, we anticipate that a greater swimming performance will allow them to avoid being caught. If an adult fish is caught in the trap, it will be released alive, with as little handling stress as possible. It is more likely that post-spawn moribund steelhead may be caught in the trap. If a dead steelhead is found in the trap we will determine if it is a pre-spawn or post-spawn fish. If a pre-spawn steelhead is incidentally collected, Leslie Schaeffer of NOAA fisheries will be notified immediately. All incidental juvenile fish mortalities (not to exceed 5%) will be put on ice and delivered to the U.S. Fish and Wildlife Service's Lower Columbia River Fish Health Center, which will provide a thorough disease profile as part of the U. S. Fish and Wildlife Service's National Wild Fish Health Survey (see contact information in Section E). These data will provide an important baseline on the health of existing fish populations in the selected sites.

H. **Description and Estimates of Take: (see Table 1.)**

1. Permission is requested to "take" White Salmon River steelhead, and Chinook, coho, pink and chum salmon for scientific purposes. Chinook and coho salmon are listed as threatened in the Lower Columbia River ESU, steelhead are listed as threatened in the Middle Columbia River ESU, and chum salmon are listed as threatened in the Columbia River ESU.

2. Sampling will occur from one mile upstream of mouth of the White Salmon River to Condit Dam at river mile 3.25, primarily in March through October, but may include limited sampling in all months of the year to accomplish project tasks.

3. In the Lower Columbia River ESU (LCR) Chinook salmon were listed as a threatened species on March 24, 1999. In the Middle Columbia River ESU (MCR), steelhead were listed as a threatened species on March 25, 1999. In the Columbia River ESU (CR), chum salmon were listed as a threatened species on March 25, 1999. In the Lower Columbia River ESU, coho salmon were listed as a threatened species on June 28, 2005. On April 30, 2002, NOAA's National Marine Fisheries Service (NOAA Fisheries Service) withdrew critical habitat designations from these and other ESA-listed Pacific salmon stocks in order to do a more thorough analysis of the economic impacts of these designations. On September 2, 2005, NOAA Fisheries Service proposed critical habitat for LCR

coho salmon, and designated critical habitat for MCR steelhead, LCR Chinook salmon, and CR chum salmon.

4. Estimated maximum mortality from our collection activities will be less than 5% of juveniles. Such a rate would result in the following figures for LCR Chinook salmon and coho salmon, MCR steelhead, and CR chum salmon.

    - 300 juvenile MCR steelhead (5% of 6,000)
    - 300 juvenile LCR Chinook salmon (5% of 6,000)
    - 300 juvenile LCR coho salmon (5% of 6,000)
    - 50 juvenile CR chum salmon (5% of 1,000)

    We do not expect any handling or mortality of adult salmonids, but it is possible that we will encounter adult steelhead and possibly spring Chinook during our surveys of the White Salmon River. Therefore, we request to capture/handle/release a small number (5 of each) of adult steelhead and adult Chinook in case of accidental interception. We will take care not to electrofish where adults are obviously present so as to avoid this incidental take. All juvenile mortalities will be delivered to the U.S. Fish and Wildlife Service's Lower Columbia River Fish Health Center, which will provide a thorough disease profile (see contact information in Section E).

5. Fish sampling has occurred at river mile 1.0 in 1983 and river mile 1.6 in 1984 using an incline plane screen trap (Seiler and Neuhauser 1985). Catch rates from this effort were used to estimate the fish numbers that might be encountered using a screw trap. Mortality for similar sampling activities by the Columbia River Research Laboratory and Washington Department of Fish and Wildlife in the Wind River watershed has consistently been under 5%.

I. **Transportation and Holding:**

Fish will be transported and released approximately 0.5 miles upstream of the screw trap to determine screw trap efficiency. Fish will be held in aerated coolers (cooler numbers will depend on fish numbers), temperature will be monitored and river water will be used to refresh the coolers regularly. Transit time will be approximately 20 minutes. Fish will be transported by boat from the screw trap location to a nearby vehicle which will drive the fish to an access point upstream of the screw trap. This holding and transportation will occur mainly in the second year of study, although some preliminary efficiency estimates may occur in the first year.

When electrofishing, running the screw trap, or minnow trapping, fish will be held in five gallon buckets or coolers (depending on fish numbers) while fish collection and data collection are occurring (about 20 to 30 minutes). Other than for efficiency estimates, fish will be released in the same areas they were collected.

J. **Cooperative Breeding Program:**

As appropriate, we are willing to participate in a cooperative breeding program and will maintain or contribute data to a breeding program if such action is requested.

K. **Previous or Concurrent Activities Involving Listed Species:**

Permit 1135 – Wind River steelhead, species: LCR steelhead

Permit 1383 – Evaluate status of coastal cutthroat trout, species: MCR steelhead, LCR steelhead, LCR Chinook salmon, CR chum

Permit 1480 – Lower Methow tributaries effectiveness monitoring, species: Upper Columbia River (UCR) spring Chinook, UCR steelhead.

L. **Certification:**

I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand this information is submitted for the purpose of obtaining a permit under the Endangered Species Act of 1973 (ESA) and regulations promulgated thereunder, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or to penalties under the ESA.

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Signature Date

Dena Gadomski
Fishery Biologist
ESA Coordinator

References:

Chapman, D. G. 1951. Some properties of the hypergeometric distribution with applications to zoological sample censuses. University of California Publications in Statistics 1:131-160.

Seiler, D., and S. Neuhauser (1985). Evaluation of downstream migrant passage at two dams: Condit Dam, White Salmon River, 1983 and 1984, Howard Hansen Dam, Green River 1984. Washington Department of Fisheries, Prog. Report No. 235, Olympia, WA.

Thedinga, J. F., S. W. Johnson, K V. Koski, J. M. Lorenz, and M. L. Murphy. 1994. Determination of salmonid smolt yield with rotary screw traps in the Situk River, Alaska, to predict effects of glacial flooding. North American Journal of Fisheries Management 14:837-851.

Thedinga, J. F., and S. W. Johnson. 1995. Retention of jet-injected marks on juvenile coho and sockeye salmon. Transactions of the American Fisheries Society 124:782-785.

Table 1. Requested take of Chinook salmon (*O. tshawytscha*), coho salmon (*O. kisutch*), chum salmon (*O. keta*), and steelhead (*O. mykiss*) from the lower White Salmon River, WA.

Take Number	Species, ESU	Life stage	Sex	Origin	Take activity category	Maximum mortality esitmate	Genetics tissue samples	Location	Dates
6000	Steelhead, Middle Columbia	fry, juvenile	NA	Wild	Capture, handle, release	300	50	WA, White Salmon River	January-December
5	Steelhead, Middle Columbia	adults	NA	Wild	Capture, handle, release	1	0	WA, White Salmon River	January-December
6000	Chinook, Lower Columbia	fry, juvenile	NA	Wild	Capture, handle, release	300	100	WA, White Salmon River	January-December
5	Chinook, Lower Columbia	adults	NA	Wild	Capture, handle, release	0	0	WA, White Salmon River	January-December
6000	Coho, Lower Columbia	fry, juvenile	NA	Wild	Capture, handle, release	300	50	WA, White Salmon River	January-December
5	Coho, Lower Columbia	adults	NA	Wild	Capture, handle, release	0	0	WA, White Salmon River	January-December
1000	Chum, Columbia River	fry, juvenile	NA	Wild	Capture, handle, release	50	50	WA, White Salmon River	January-December
5	Chum, Columbia River	adult	NA	Wild	Capture, handle, release	0	0	WA, White Salmon River	January-December